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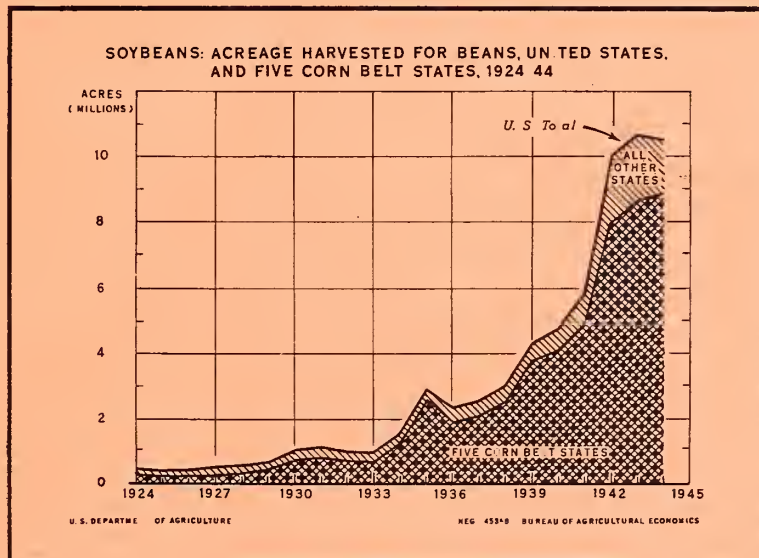
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SOYBEAN PRODUCTION

IN
WAR AND PEACE



by
Edwin G. Strand
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Source of Data

Data and other information for this report have been obtained from numerous sources. Acreage, yield, and production data from 1924 through 1944 were obtained from reports of the Bureau of Agricultural Economics. Soybean acreage and production for years previous to 1924 are from U.S.D.A. Yearbooks, and although these data are not as accurate as those for later years, they are the best estimates available. Data on utilization of soybean oil and soybean oil meal and on prices of oils and oil meals were obtained from records in the Bureau of Agricultural Economics. Articles in a number of issues of the U.S.D.A. Yearbook provided much of the historical information on improvement and expansion of the soybean crop and on progress in utilization of soybeans for various purposes. Information was also obtained from the following sources: State Experiment Station and U.S.D.A. bulletins and reports, articles in trade journals, personal interviews with agricultural research and extension workers at the State Colleges in Illinois, Indiana, and Iowa, conversations and discussions with members of the staff of the Northern Regional Research Laboratory at Peoria, Illinois, and with a number of persons connected with the soybean processing and mixed feed industries in the North Central States, and with farmers who were growing soybeans.

Acknowledgments

This report has been reviewed and suggestions have been contributed by the following: William J. Morse and O. S. Aamodt in the Bureau of Plant Industry, Soils and Agricultural Engineering, N. R. Ellis in the Bureau of Animal Industry, R. E. Hodgson and Ernest Kelly in the Bureau of Dairy Industry, Miss Faith Clark in the Bureau of Human Nutrition and Home Economics, and H. W. Marston, Research Coordinator--all of the Agricultural Research Administration of this Department. E. G. Schiffman in the Farm Credit Administration contributed information on the subject of soybean processing. Within the Bureau of Agricultural Economics information and suggestions were received from numerous individuals, especially Robert M. Walsh, Sherman E. Johnson, and Ronald L. Mighell.

SOYBEAN PRODUCTION IN WAR AND PEACE

By Edwin G. Strand, Agricultural Economist

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Development of the Enterprise

The soybean is one of the oldest crops grown by man. It has been extensively cultivated in China since long before written records were kept. In American agriculture, however, it is largely a crop of the twentieth century.

First importations of soybean seed into the United States probably were obtained from eastern Asia. The soybean was first mentioned in our literature in 1804, as being "adapted to Pennsylvania," but its culture in the United States was limited to that of a rare garden plant until near the end of the 19th century. Previous to 1898 not more than 8 varieties, with a limited range of adaptation, were grown. In 1898 the United States Department of Agriculture began to introduce a great many varieties of soybeans, and this was accompanied by a program of improvement through selection

and breeding, not only by the Department but also by several of the State agricultural experiment stations. By 1937 the U. S. Department of Agriculture and State Experiment Stations had brought into the United States more than 10,000 soybean selections for study and experiment. 1/

At the present time more than 100 varieties of soybeans, adapted to a wide range of soil and climatic conditions, are generally grown or are being increased for seed in the United States. A large number of varieties is necessary if soybeans are to be grown successfully in different regions. In general, a given variety of soybeans is adapted to a rather limited range of soil and climatic conditions.

The rise of the soybean as an American crop in the twentieth century has been dramatic. The acreage grown for all purposes was expanded from about 50,000 acres in 1907 to about 460,000 acres in 1917. In 1924, the planted acreage exceeded one and three-fourths million, in 1934 it was over 6 million, and in 1943 it was almost 16 million acres (table 1).

From the initial expansion until about 18 years ago, most of the soybeans in this country were grown in the southern and eastern States. In 1919, the five leading States in soybean acreage were, in the order named, North Carolina, Virginia, Mississippi, Kentucky, and Alabama. By 1924, however, the relatively more rapid expansion of the crop in the north central region of the country had brought Illinois into the leading position, followed by Indiana, Tennessee, North Carolina, and Missouri. Illinois has held the lead among the States ever since, and the Corn Belt has grown in importance as a region of soybean production. Five Corn Belt States 2/ accounted for 70 percent of the total acreage planted and 84 percent of the acreage harvested for beans in 1944.

At first, and for several years, soybeans in the United States were grown primarily as a forage crop. In fact, previous to 1930 the acreage harvested for beans was generally less than one-fourth of the total grown for all purposes, in the United States as a whole. With the adoption of improved varieties for bean production and with the development of markets for soybeans for crushing a gradual increase in the proportion harvested for beans began to get underway. In 1939, 40 percent of the total planted acreage of soybeans was harvested for beans. The proportion grown for this purpose increased rapidly during the war years. In 1944, 72 percent of the total planted acreage was harvested for beans.

1/ An outstanding personality in this work is William J. Morse, of the U.S.D.A., who traveled extensively throughout China, Manchuria, Japan, and other Asiatic countries, making observations and selections of soybeans grown there.

2/ Illinois, Iowa, Indiana, Ohio, and Missouri. (This was the order of rank of these States in both acreage and production of soybeans in 1944).

Table 1.- Soybean production in the United States, 1924-1944 1/

Year	Acres planted		Acres harvested		Grazed, plowed or abandoned		Average yield per acre harvested		Total production	
	Grown alone	Inter-planted	Equivalent solid 2/	For beans 3/	For hay	under or abandoned	For beans	For hay	Beans	Hay
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	acres	Bushels	Tons	1,000 bushels	1,000 tons
1924	1,567	417	1,782	448	1,147	187	11.0	1.13	4,947	1,299
1925	1,539	476	1,785	415	1,175	195	11.7	1.01	4,875	1,185
1926	1,871	502	2,127	466	1,431	230	11.2	1.18	5,239	1,667
1927	2,057	571	2,350	568	1,556	226	12.2	1.18	6,938	1,837
1928	2,154	556	2,439	579	1,609	251	13.6	1.23	7,880	1,974
1929	2,429	743	2,807	708	1,774	325	13.3	1.16	9,438	2,051
1930	3,072	786	3,473	1,074	2,062	337	13.0	.94	13,929	1,938
1931	3,835	909	4,304	1,141	2,772	391	15.1	1.26	17,260	3,479
1932	3,704	893	4,165	1,001	2,738	426	15.1	1.25	15,158	3,433
1933	3,537	813	3,957	1,044	2,506	407	12.9	1.16	13,509	2,917
1934	5,764	853	6,207	1,556	4,227	424	14.9	1.08	23,157	4,545
1935	6,966	1,028	7,503	2,915	4,044	544	16.8	1.34	48,901	5,422
1936	6,127	2,115	7,183	2,359	3,116	1,708	14.3	.96	33,721	3,002
1937	6,332	2,261	7,464	2,586	3,469	1,409	17.9	1.36	46,164	4,731
1938	7,318	2,541	8,587	3,035	3,724	1,828	20.4	1.43	61,906	5,335
1939	9,565	2,710	10,920	4,315	4,590	2,015	20.9	1.48	90,141	6,772
1940	10,529	2,588	11,823	4,786	4,894	2,143	16.2	1.34	77,468	6,560
1941	10,146	2,490	11,391	5,881	3,677	1,833	18.0	1.30	105,587	4,779
1942	13,879	2,443	15,102	10,008	2,738	2,356	13.7	1.35	187,155	3,689
1943	14,575	2,558	15,854	10,684	3,387	1,783	18.1	1.20	193,125	4,060
1944	13,564	1,908	14,519	10,502	2,747	1,270	18.4	1.17	192,863	3,217

1/ Source of data: Division of Agricultural Statistics, Bureau of Agricultural Economics, U. S.

Department of Agriculture. (No official estimates for the U. S. were made for years previous to 1924).

2/ Grown with other crops.

3/ Equivalent solid acreage (acreage grown alone, with an allowance for acreage grown with other crops.)

Standards for use in grading and marketing soybeans were announced by the United States Department of Agriculture in September 1925. A futures market for soybeans was established in Chicago in October 1936.

A soybean oil and protein laboratory was established in 1929 at Holgate, Ohio, by the U.S.D.A., Bureau of Plant Industry to conduct investigations aimed toward development of high-oil and high-protein varieties and low-oil varieties. 3/

The United States Regional Soybean Industrial Products Laboratory (made possible by the Bankhead-Jones Act, passed in June 1935) began operations at Urbana, Illinois, in the spring of 1936. Since that time the Laboratory, in cooperation with State experiment stations, has studied the agronomic behavior of several thousand soybean plant introductions and selections, compiling data on such factors as yield, lodging resistance, shattering resistance, height of plant, and seed quality. In July 1942 the laboratory work devoted to development of new industrial uses for soybeans was transferred from Urbana to the Northern Regional Research Laboratory at Peoria, Ill. At this time the territory served by the Laboratory at Urbana was expanded to include 12 southern States in addition to the 12 North Central States originally served. The Regional Research Laboratory at Peoria has performed much research on soybean processing and on the utilization and processing of the oil and meal for food and industrial products.

A summary of soybean production data for the United States, by years, from 1924 through 1944, is given in table 1. The total acreage and production at the beginning of this period was relatively small. A significant increase in acreage occurred during the 1930's, and this trend was accelerated after the beginning of World War II. The acreage harvested for beans increased at a more rapid rate than the total acreage grown for all purposes. The acreage harvested for hay increased much more slowly--the exceptions to this being the relatively large acreages in 1934 and 1935 and the decreased acreage since 1940. There has been a significant upward trend in the yields of soybeans harvested for beans and a somewhat slower upward trend in yields for hay. Total production (bushels) of soybeans in 1944 was 39 times as large as in 1924; total production of soybean hay was two and one-half times as large as in 1924.

An important factor in the sharp increase in acreage of soybeans in 1934 over 1933 was the severe drought, which ruined large acreages of corn, small grains, and tame hay in the early season of 1934--as a result of which many farmers planted soybeans as an emergency crop. A large proportion of the soybean acreage was harvested for hay in 1934, and again in 1935, because of the need for replacing or supplementing other tame hays which had been reduced by the drought. The decrease in acreage of soybeans

3/ When soybeans are wanted principally for use as, or in the manufacture of, protein feeds or foods, a high percentage of protein and a low percentage of oil are desirable; when the principal emphasis is on production of oil, soybeans with a high oil content are preferred.

used for hay after 1940 was the result of the strong wartime demand for beans, coupled with the decreased need for soybean hay because of the good yields and large production of other kinds of hay.

The AAA program was a stimulus to the expansion in acreage of soybeans in the last half of the 1930's. Corn-acreage limitations and allotments restricted the acreage of corn and so increased the acreage of cropland available to other crops. Soybeans for beans, although classified as a soil-depleting crop in the principal commercial-producing region, competed effectively for a part of this acreage. Soybeans for hay were not classed as soil-depleting after 1936. Soybeans plowed under were classed as a soil-building crop and were encouraged by the AAA program. This was perhaps the principal reason for the increased acreage of soybeans plowed under in the years following 1935.

The greatest annual increase in acreage of soybeans harvested for beans occurred in 1942, in response to the urgent appeal by the Government early that year for a large increase in soybean production to meet wartime demands. The announced support prices for the 1942 crop and the fact that reserve stocks of feed grains were generally large throughout the main soybean-producing region encouraged farmers to grow a large acreage of soybeans. Programs of production goals and guaranteed support prices have contributed to maintaining production at a high level since 1942. Also of importance was the Government program for soybean processors, which greatly reduced their risks.

The tremendous increase in soybean production during the war came through a two-fold process: An increase in the total acreage of soybeans planted and an increase in the proportion of the acreage harvested for beans. Fifty-three percent of the increase in acreage harvested for beans, from 1940 to 1944, was the result of harvesting a larger percentage of the acreage for beans.

Production Regions

Three rather distinct regions of soybean production are found in the United States - the North Central Region, the Mississippi Delta, and the Middle Atlantic Coast (fig. 1). There are some rather significant differences between these regions in the trends in acreage, utilization, and yields of soybeans. Several of these differences are brought out in the tables, charts, and discussion following.

For the sake of simplicity and convenience in tracing trends and making comparisons, the totals or averages for selected groups of States in each region are shown. These States represent the great bulk of soybean production in the respective regions. The groups of States are as follows: North Central, or Corn Belt -- Illinois, Indiana, Ohio, Iowa, and Missouri; Delta -- Arkansas, Mississippi, and Louisiana; Middle Atlantic Coast -- North Carolina, Virginia, Maryland, and Delaware. For some comparisons, other groupings of States are also used.

SOYBEANS HARVESTED FOR BEANS, ACREAGE, 1944

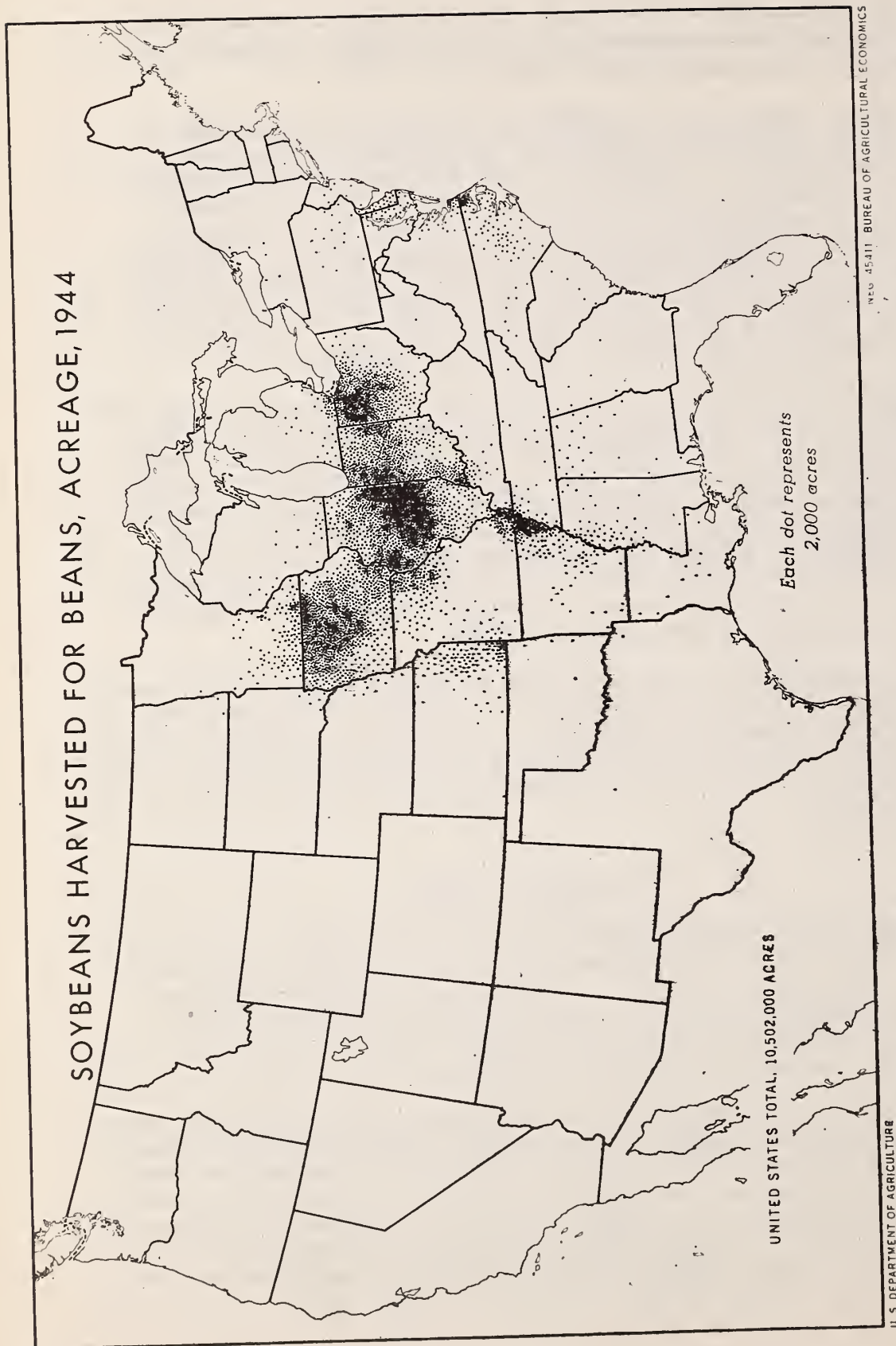


Figure 1.- Soybeans for beans are an important crop in three general regions - the North Central Region, the Mississippi Delta, and the Middle Atlantic Coast. The North Central Soybean Region, which includes most of the Corn Belt plus adjacent areas to the north and south, has about 90 percent of the acreage, and greatly overshadows the two smaller regions. The heaviest concentration of acreage is in Illinois, where in some counties the crop has occupied more than 40 percent of the cropland during the war years.

From 1924 to 1941 the rate of increase in acreage of soybeans planted for all purposes in the Delta was about the same as that in the Corn Belt States. Since 1941, however, the rate of expansion in the Corn Belt States has exceeded that in the Delta. The rate of increase since 1924 has been slower in the Middle Atlantic Coast States than in the other two regions. The relative acreage, by years in each region, on the basis of the 1935-39 average as 100, is shown graphically in figure 2.

Yields and Production

Of the total acreage of soybeans grown, a larger percentage is harvested for beans in the Corn Belt than in either of the other two regions (table 2). In 1944, 88 percent of the acreage in the five Corn Belt States was harvested for beans, while the percentages in the Middle Atlantic Coast States and in the Delta were only 36 percent and 29 percent, respectively. The percentage harvested for beans in the Corn Belt has increased very considerably since 1924, whereas the proportion so used in the Atlantic Coast States has remained relatively stable. That in the Delta actually declined from 1924 to 1930, remained relatively stable until 1940, and then increased in 1941 and 1942.

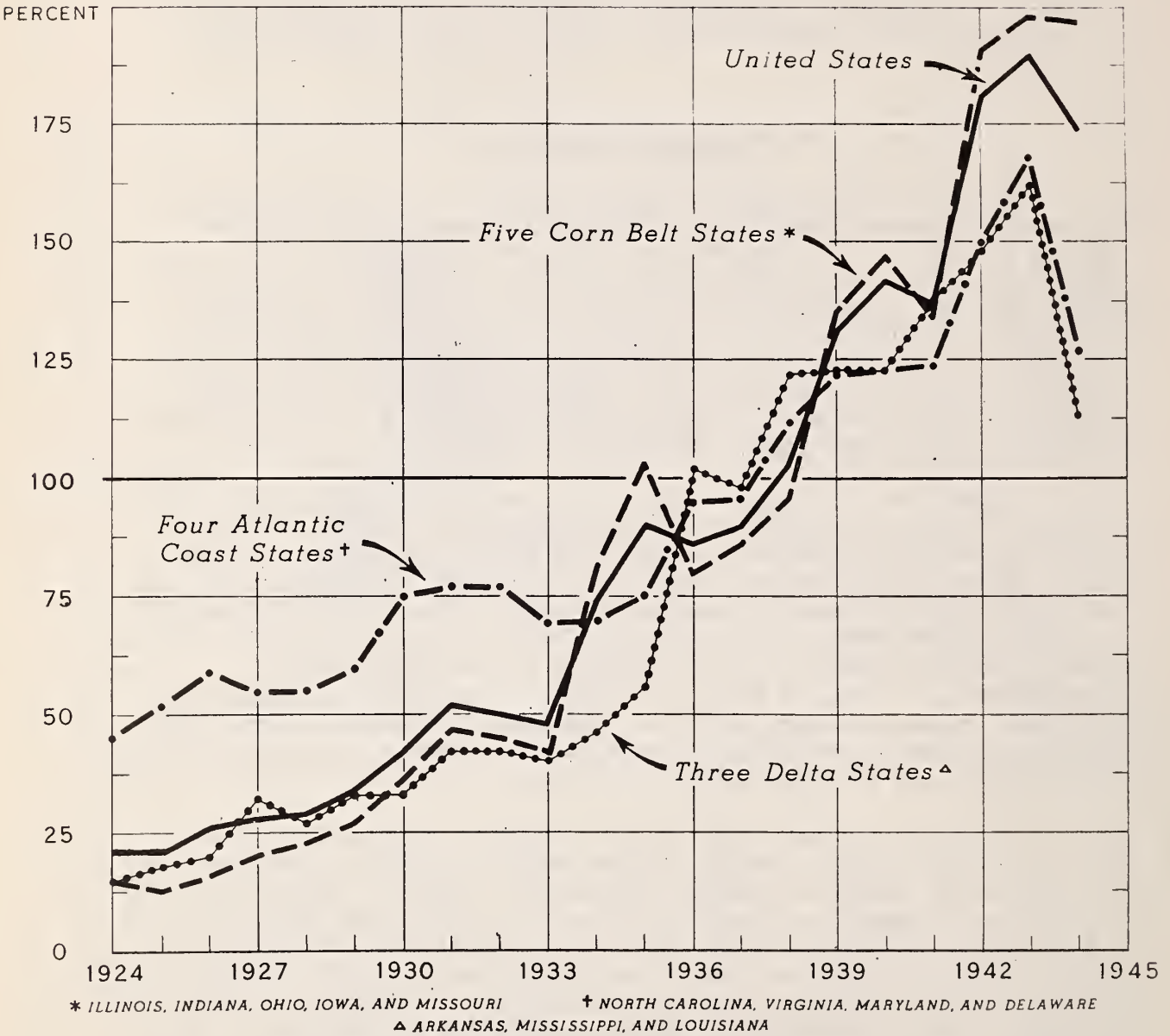
Increases in acreage of soybeans harvested for beans were accompanied by increasing yields in the United States as a whole. Yield increases were most pronounced in the Corn Belt States, where average yields approximately doubled between 1924 and 1939. Following 1939, and associated with the greatly expanded acreage, average yields dropped to a slightly lower level in the Corn Belt States. However, they were still about 65 percent above the yields obtained in the middle 20's. (See table 11, p. 38, and fig. 3.) Yields in the Delta fluctuated considerably between 1924 and 1936, but increased substantially from 1936 to 1944. Yields in the Atlantic Coast States showed a downward trend from 1924 to 1930, and have since then been rather irregular.

Yields of soybean hay have moved moderately upward in the Corn Belt and Atlantic Coast States. In the Delta no definite long-time trend in soybean hay yields is apparent (table 11). Yields of soybean hay in 1942 averaged higher than the 1935-39 level in all regions but dropped to a lower level in 1943 and 1944. Part of the decrease in yields obtained during the last 2 years may have come through the fact that a larger proportion of the soybean-hay acreage consisted of cuttings made around fields of soybeans to be harvested for beans, in clearing the margins of such fields for harvesting machinery. Late planting of soybeans cut for hay and drought conditions in some areas were probably even more important factors in accounting for the lower yields.

That yields of soybeans for beans have been maintained at a relatively high level during the war is noteworthy. During these years the acreage harvested for beans has been approximately doubled by expansion

SOYBEANS: ACREAGE PLANTED FOR ALL PURPOSES, UNITED STATES AND SELECTED GROUPS OF STATES, 1924-44

INDEX NUMBERS (1935-39=100)



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Figure 2.- The acreage of soybeans planted for all purposes increased rapidly in all of the three soybean regions from 1924 to 1943. The rate of increase in the Corn Belt and Delta regions exceeded the rate of increase in the Atlantic Coast Region. The trend for the United States as a whole has closely paralleled that in the Corn Belt Region, represented in this figure by Illinois, Indiana, Ohio, Iowa, and Missouri.

Table 2.- Soybeans: Acreage harvested for beans, as percentage of acreage planted for all purposes, United States and specified regions, 1924-44

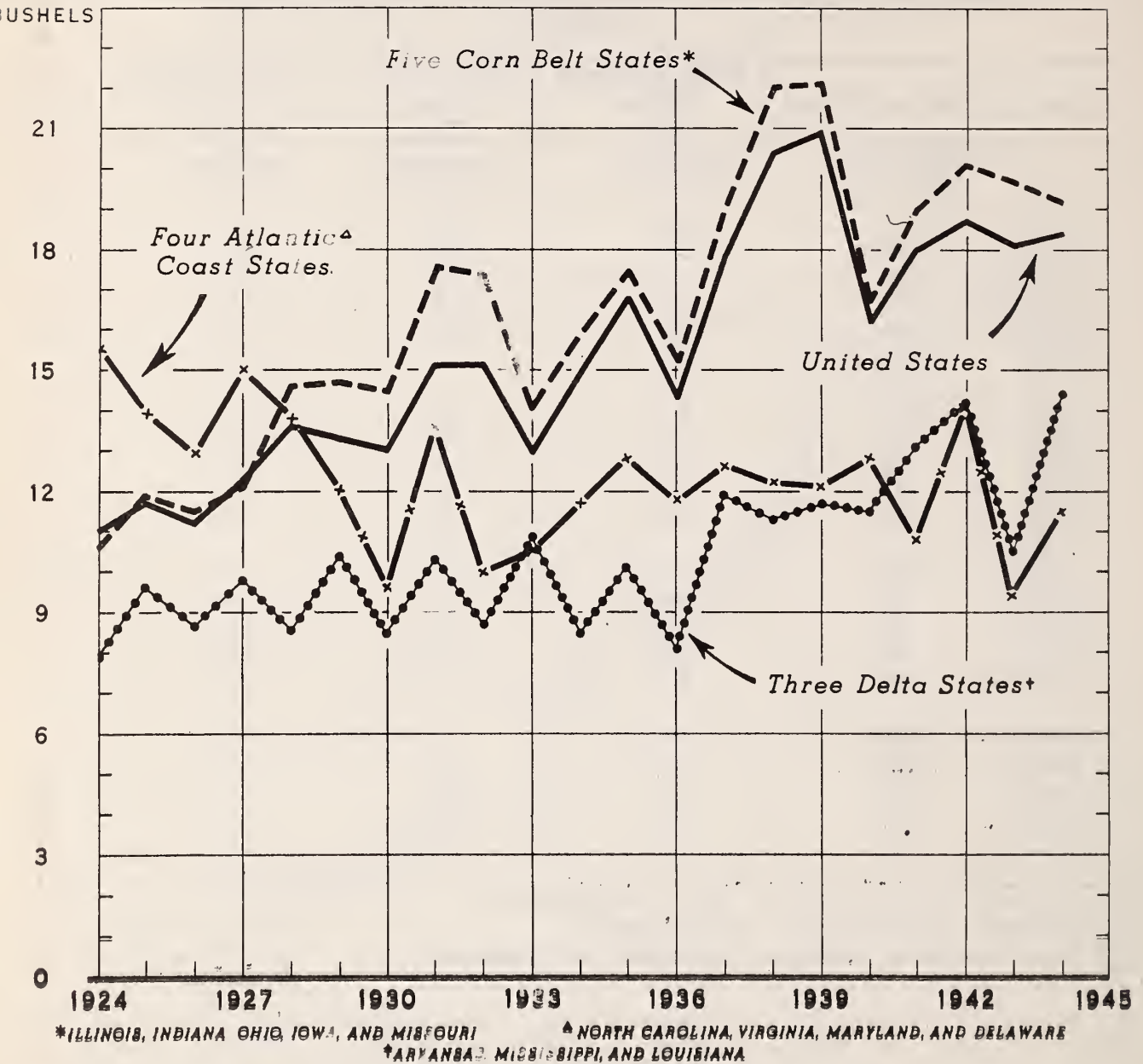
Year	: United States	: Five Corn Belt States	: Three Delta States	: Four Atlantic Coast States
	: 1/	: 2/	: 3/	
	: <u>Percent</u>	: <u>Percent</u>	: <u>Percent</u>	: <u>Percent</u>
1924	: 25	: 34	: 20	: 34
1925	: 23	: 32	: 19	: 31
1926	: 22	: 31	: 16	: 27
1927	: 24	: 36	: 13	: 30
1928	: 24	: 32	: 11	: 30
1929	: 25	: 34	: 11	: 31
1930	: 31	: 43	: 10	: 31
1931	: 26	: 34	: 11	: 32
1932	: 24	: 31	: 9	: 28
1933	: 26	: 36	: 9	: 31
1934	: 25	: 31	: 11	: 32
1935	: 39	: 49	: 12	: 30
1936	: 33	: 48	: 10	: 30
1937	: 35	: 49	: 10	: 31
1938	: 35	: 52	: 8	: 29
1939	: 40	: 55	: 7	: 28
1940	: 40	: 54	: 9	: 29
1941	: 52	: 72	: 14	: 31
1942	: 66	: 82	: 31	: 44
1943	: 67	: 86	: 25	: 36
1944	: 72	: 88	: 29	: 36

1/ Illinois, Indiana, Ohio, Iowa, and Missouri.

2/ Arkansas, Mississippi, and Louisiana.

3/ North Carolina, Virginia, Maryland, and Delaware.

SOYBEANS: YIELDS PER ACRE HARVESTED FOR BEANS, UNITED STATES AND SELECTED GROUPS OF STATES, 1924-44



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Figure 3.- There has been a strong upward trend in yields of soybeans in the Corn Belt and in the United States as a whole since 1924. Average yields in the Delta fluctuated between 8 and 11 bushels per acre from 1924 to 1937, and since then have moved upward to a level higher than average yields in the Atlantic Coast region. In the Atlantic Coast region yields have shown little trend since 1931, although the direction was downward before that time. Yields in the five Corn Belt States have averaged about 60 percent higher than yields in the other two regions during the last 4 years.

to new acres and by encroachment on acreages formerly grown for hay. Generally favorable weather has helped in the attainment of high yields. But the development and use of better adapted and higher yielding varieties have also been influential.

Over the longer period (from 1924 to the present time) improved methods of culture and especially of harvesting have contributed to increasing yields. For example, it is estimated that before the combine was used almost 30 percent of the beans produced were lost, whereas at present, where the combine is used, the average loss in harvesting is about 9 percent. ^{4/} The combine was first used for harvesting soybeans in Illinois in 1924. In recent years all but a small proportion of the acreage of soybeans for beans in the Corn Belt has been harvested with combines.

More progress has been made in the development of improved bean-producing varieties of soybeans for the North Central States than for any other region. A large proportion of the soybeans harvested for beans in the Southern States has consisted of forage varieties, some of which were introduced more than 25 years ago. Development of higher yielding varieties for the South has progressed considerably in recent years. In the Delta percentage increases in yields since 1939 have been larger than in the Corn Belt.

Insects and diseases have reduced soybean yields in the Southern States more than they have in the Corn Belt. Moreover, in the Atlantic Coast States the soils that are well adapted to soybeans are more limited than in the Corn Belt. Expansion of acreage in Virginia and North Carolina has therefore meant poorer soils for a larger proportion of the acreage. Soybeans on these soils are also more adversely affected by summer droughts.

Expansion in the North Central States

Since 1940, the five leading States in soybean production have been Illinois, Iowa, Indiana, Ohio, and Missouri. In 1944, this group accounted for 88 percent of all the soybeans (bushels) produced in the Nation. The proportions of the total national acreage and production harvested in these five States and in the rest of the United States since 1924 are shown in table 3.

The rise in relative importance of the Corn Belt as a region of soybean production was not the result of any reduction in other parts of the country - it came through the more rapid rate of expansion in the Corn Belt. As shown in figure 2, the acreage planted for all purposes has continually increased in all of the three principal regions. The tremendous expansion of soybean acreage in the Corn Belt is also graphically shown on the cover page.

^{4/} See article by E. W. Lehmann and H. W. Bateman, "Contributions of Machinery and Power to Soybean Production," in the Soybean Digest, September 1944 issue.

Table 3.- Soybeans harvested for beans: Acreage and production in five Corn Belt States and in all other States, as percentages of the totals for the United States, 1924-44

Year	Acreage		Production	
	Corn Belt	All	Corn Belt	All
	States	other	States	other
	1/	States	1/	States
	Percent	Percent	Percent	Percent
1924	58	42	55	45
1925	52	48	52	48
1926	56	44	58	42
1927	63	37	63	37
1928	65	35	70	30
1929	67	33	73	27
1930	74	26	83	17
1931	72	28	84	16
1932	72	28	83	17
1933	74	26	80	20
1934	82	18	88	12
1935	89	11	93	7
1936	82	18	88	12
1937	83	17	89	11
1938	84	16	91	9
1939	87	13	93	7
1940	86	14	89	11
1941	84	16	89	11
1942	79	21	85	15
1943	81	19	89	11
1944	84	16	88	12

1/ Illinois, Indiana, Ohio, Iowa, and Missouri.

Table 4 indicates the rates of expansion of soybean acreage in three different parts of the North Central region. From 1933 to 1938 the most rapid increase in planted acreage took place in the area of Illinois, Indiana, and Ohio. From 1938 to 1942, however, planted acreage increased most rapidly in Iowa and Missouri and in the Lake States (Minnesota, Wisconsin, and Michigan). The greatest relative wartime increases in acreage harvested for beans also occurred in the Lake States and in the Iowa-Missouri area. Trends of yields in these groups of States are indicated by the data in table 13 (p. 39).

These figures verify the observation that since 1938 the capacity for expansion has been relatively greater in the western and northern parts of the North Central soybean region than it has been in the area of most concentrated production (Illinois-Indiana-Ohio). However, the fact that acreage in the Lake States was reduced after 1942 indicates that expansion in this area in 1942 was perhaps greater than was really profitable with prevailing conditions and practices.

Data on soybean production in the Lake States are of interest as an indication of the northward expansion of the soybean crop. The acreage harvested for beans in these three States increased from a total of 155,000 in 1940 to 422,000 in 1944.

The extreme western fringe of the North Central soybean region is represented by South Dakota, Nebraska, and Kansas. The total acreage harvested for beans in these three States increased from 31,000 in 1940 to 260,000 in 1944. This represents a much more rapid rate of expansion than that occurring in the three Lake States.

The peak in soybean acreage in the three western fringe States came in 1943. That year, Nebraska harvested more acres of soybeans than Wisconsin, while Kansas harvested almost as large an acreage as Minnesota. But yields of soybeans were below average in the three western fringe States, and this was primarily responsible for a downward readjustment of acreage in 1944. Yields obtained in 1944 were the highest on record for the 3-State area. The rapid rate of adoption of better adapted varieties and the accumulation of skill in growing soybeans favor retention and increase of the soybean crop in the present western fringe. It is not unlikely that in the future the rate of westward expansion will exceed the rate of northward expansion of the crop.

Utilization of Soybeans

Data on utilization of the soybean crop in the United States as a whole and in the Corn Belt (5 States) are given in table 14. Trends in acreages used for beans and for hay are shown in figure 4.

Table 4.- Soybeans: Index numbers of acreage planted and acreage harvested for beans in different parts of the North Central group of States, 1933-44

(1935-39 = 100)

Year	: Illinois, Indiana : : and Ohio :		: Iowa and Missouri : :		: Minnesota, Wisconsin : : and Michigan :	
	: Total	: Harvested	: Total	: Harvested	: Total	: Harvested
	: planted	: for beans	: planted	: for beans	: planted	: for beans
1933	: 36	24	59	63	46	26
1934	: 67	43	119	77	125	28
1935	: 96	93	124	132	101	56
1936	: 82	78	72	57	64	53
1937	: 91	85	74	70	87	67
1938	: 96	100	98	88	96	114
1939	: 135	143	132	153	154	214
1940	: 144	150	155	196	207	360
1941	: 131	175	143	271	186	505
1942	: 182	259	211	549	268	1,126
1943	: 191	281	218	608	189	970
1944	: 188	280	224	656	193	981

During most of the period for which statistics on soybean production are available the acreage harvested for hay was larger than the acreage harvested for beans. This was true until 1935 for the Corn Belt States and until 1941 for the United States as a whole. Soybean hay is fed to all classes of roughage-consuming livestock. Much of it is fed to dairy cattle, for which it is an excellent feed when it has been properly harvested and cured. For several years it has been an important emergency legume hay crop in the North Central States. In the Southern States the soybean crop is still principally used for hay.

SOYBEANS: ACREAGE PLANTED FOR ALL PURPOSES AND ACREAGES HARVESTED FOR BEANS AND FOR HAY, UNITED STATES AND FIVE CORN BELT STATES, 1924-44

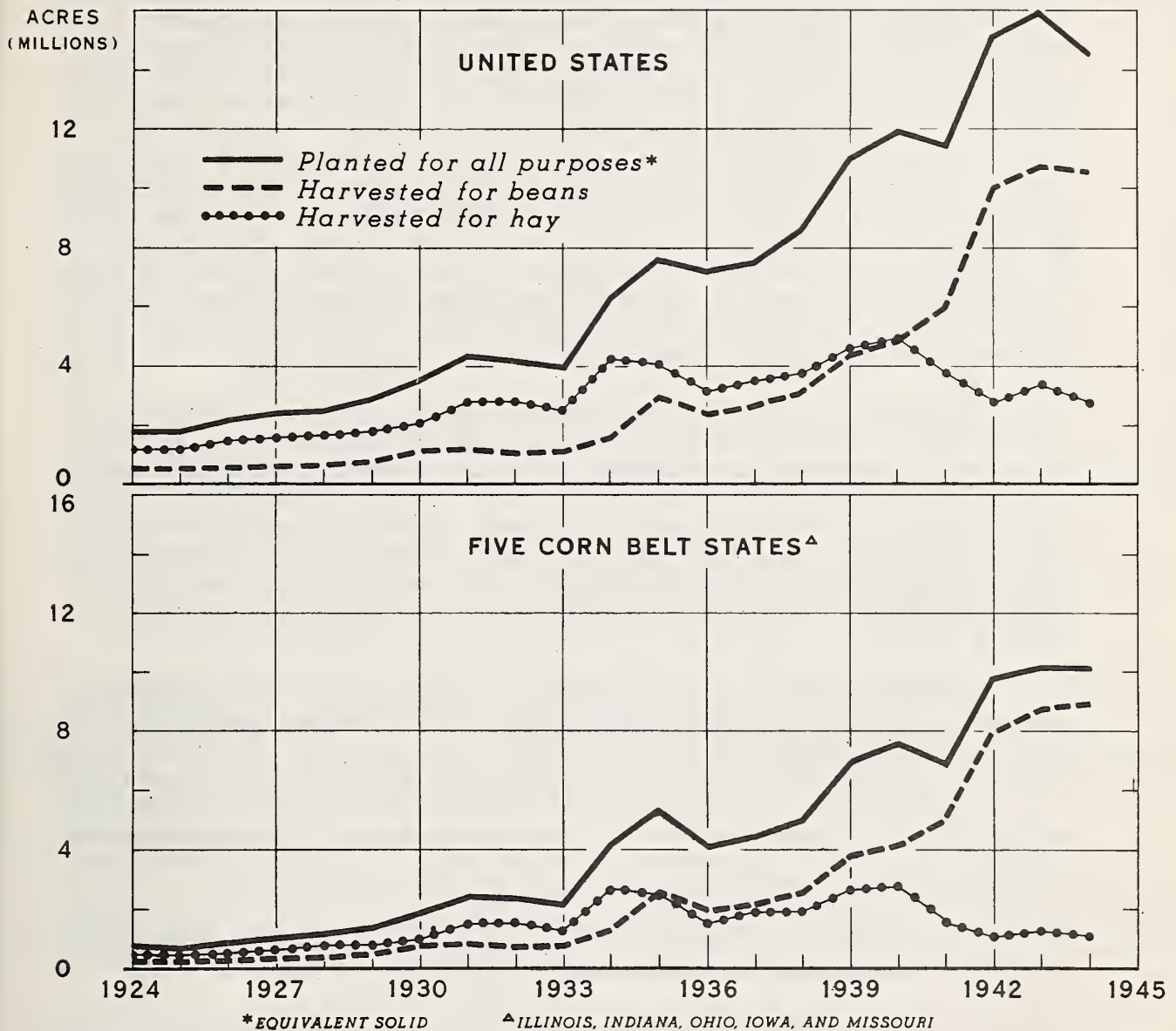


Figure 4.- The acreage of soybeans harvested for hay was larger than the acreage harvested for beans until 1935 in the Corn Belt States and until 1941 in the United States as a whole. The sharp increase in acreage for beans in 1942 was stimulated by the war. A part of the increase in acreage harvested for beans came out of soybeans harvested for hay. During the last 10 years from 85 to 93 percent of all the soybeans in the United States have been produced in the five Corn Belt States.

Most of the acreages of soybeans used for grazing and for plowing under (green manure) are in the Southern States. The South also accounts for most of the acreage interplanted with other crops.

Because of the importance of soybeans for bean production in the Corn Belt (the region dominating the national picture) and because of the wartime urge for harvesting as large a portion of the crop as possible for beans in all parts of the country, bean production has been the leading use of the crop in the United States as a whole in the war years.

The principal uses of the beans are for processing, for seed, and for feed. The quantities used annually for these and other purposes in the United States are shown in table 5. Total domestic production, stocks and imports are also shown. Factors associated with the great increase in production have been discussed above. Stocks on hand at the beginning of the crop year have been relatively small until recent years. Imports have not been a significant portion of the total supply since 1924, and they were greatly reduced after 1932. 5/

Previous to 1935-36 the principal use of the beans harvested was for seed to plant the next year's acreage of soybeans for all purposes. In many of these years the quantity used for seed was one-third to one-half of the soybeans harvested the preceding season. Since 1935, a larger percentage of the total acreage of soybeans has been harvested for beans and, in addition, yields per acre have been larger. This has meant that a larger proportion of the harvested beans has been available for purposes other than seed. Utilization for seed is in proportion to the total acreage planted.

The quantity of soybeans used for feed on farms where grown has increased since 1924 but not in proportion to the increased quantities produced. The quantities fed are affected by the supply of unmarketable beans (beans of low quality, or lack of a market for them), price of beans for seed or processing, relative prices of other feeds, and the availability and prices of oil meals and other high-protein feeds. In some areas the grinding and feeding of soybeans to dairy cattle on the farms where produced has become a fairly common practice. 6/

5/ Large quantities of soybeans were imported from Manchuria during World War I and were crushed by cottonseed oil mills in the South.

6/ Soybeans, when fed in large quantities to dairy cows are likely to cause soft butter, and when fed to hogs are likely to cause soft pork. Feeding of large quantities of ground or whole soybeans has the tendency to produce scours in cattle. These objectionable results are due to the high oil content of soybeans. No such undesirable effects are caused by feeding soybean oil meal, because in its manufacture most or practically all of the oil has been removed. The "cooking" involved in processing also improves the feeding value. When ground soybeans are fed to dairy cows in moderate quantities (10 to 25 percent of the grain mixture) there is no adverse effect on the quality of butter produced.

Table 5.- Soybeans: Supply and utilization in the United States, 1924-44

Year beginning October 1	Supply				Utilization					Carry- over Sept. 30, 7/
	Total stocks	Production	Imports	Total supply	Seed	Feed	Processing	Exports	Other uses	
	Oct. 1, 1/	2/	3/	4/	5/	5/	6/	6/	6/	
	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.	1,000 bu.
1924-25	5	4,947	65	5,017	1,941	1,207	307	---	1,560	2
1925-26	2	4,875	62	4,939	2,336	1,174	351	---	1,078	8/
1926-27	8/	5,239	68	5,307	2,570	1,311	335	---	1,089	2
1927-28	2	6,938	71	7,011	2,721	1,631	559	---	2,100	8/
1928-29	8/	7,880	77	7,957	3,041	1,473	882	---	2,491	70
1929-30	70	9,438	64	9,572	3,811	1,717	1,666	---	2,262	116
1930-31	116	13,929	54	14,099	4,749	1,929	4,069	---	2,858	494
1931-32	494	17,260	49	17,803	4,583	1,975	4,725	2,160	4,238	122
1932-33	122	15,158	13	15,293	4,250	1,985	3,470	2,450	3,080	58
1933-34	58	13,509	6	13,573	7,551	2,108	3,054	0	834	26
1934-35	26	23,157	5	23,188	9,422	1,810	9,105	19	2,513	319
1935-36	319	48,901	4	49,224	8,170	3,537	25,181	3,490	8,485	361
1936-37	361	33,721	17	34,099	8,070	2,464	20,618	19	2,635	293
1937-38	293	46,164	3	46,460	10,281	3,393	30,310	1,368	768	340
1938-39	340	61,906	3	62,249	13,757	4,481	44,648	4,401	- 6,003	965
1939-40	965	90,141	2	91,108	16,068	5,577	56,684	10,949	1,437	393
1940-41	393	77,468	1	77,862	14,459	5,069	64,056	237	- 6,649	690
1941-42	690	105,587	8/	106,277	21,072	4,013	77,151	469	2,472	1,120
1942-43	6,000	187,155	8/	193,155	21,958	6,198	133,454	904	18,098	12,543
1943-44 9/	12,543	193,125	8/	205,668	20,179	5,695	142,258	934	22,270	14,332
1944-45 9/	14,332	192,863								

1/ Factory and warehouse stocks only, through October 1, 1941; total stocks, October 1, 1942-44.

2/ Crop of year listed first, e.g., the 1924 crop was 4,947,000 bushels.

3/ Imports for 1924-25 through 1927-28 are estimated from data reported for calendar years. Imports beginning with 1928-29 have been reported by crop years.

4/ Sum of stocks, production and imports. The "total supply" figures for years previous to 1942-43 are incomplete to the extent that they do not include stocks on farms, in country elevators, and at terminal markets. (Such stocks were not reported previous to October 1, 1942).

5/ Fed to livestock on farms where produced.

6/ Residual item. This includes soybeans fed to livestock other than on farms where the soybeans were produced. It may also include small quantities used for human food. In recent years this item includes soybeans milled into full-fat flour. The minus quantities shown for two years are explainable by the fact that there were unreported supplies (stocks, October 1) on farms, in country elevators, and in terminal markets.

7/ Factory and warehouse stocks only, through September 30, 1942; total stocks, September 30, 1943 and 1944.

8/ Less than 500 bushels.

9/ Preliminary.

Processing for oil and meal constituted a minor use of soybeans until about 1930, and it was not until 1935-36 that as much as one-half of the domestic production was so used. The volume of processing has increased rapidly during the last 10 years. In 1943-44 the quantity processed was equal to 74 percent of the production.

Exports of soybeans from the United States were insignificant and not separately reported before 1931. 7/ In 1931-32, because of unsettled conditions in the Orient, European importers turned to the United States for soybeans, and over 2 million bushels were exported. The European buyers liked the American soybeans because they were cleaner and were more uniform in condition and bright yellow color than importations generally obtained from the Orient. Additional exports were made in later years (table 5). The largest share of the soybeans exported in 1938-39 and in 1939-40 went to the Netherlands. The largest exports from the United States in any year occurred in 1939-40, but the quantity was only 12 percent of that year's production.

Soybean Processing

Use of soybeans for processing depended upon the development of markets for soybean oil and soybean oil meal. Such markets were developed slowly and with difficulty at first. Prospective customers were unfamiliar with soybean products, and competitive products were already established in the market.

The earliest available record of soybeans processed for oil in the United States is that of a shipment of Manchurian soybeans crushed by a hydraulic press mill at Seattle in 1910 or 1911. A small quantity of locally-grown soybeans is reported to have been crushed by a cottonseed mill in Louisiana at about the same time. The next recorded crushing of American-grown soybeans occurred in December 1915 at an expeller-type cottonseed oil mill in North Carolina. An expeller mill at Chicago Heights, Ill., crushed a small quantity in 1917-18 and intermittently during the next few years. In addition to the problem of finding markets for the oil and meal the early processors found it difficult to get enough soybeans for regular and economical operations. 8/

Soybean processing may be said to have become established as an industry in this country in the early 1920's when a number of plants were started, some of which are still in operation.

7/ In 1916 German interests are said to have exported from this country all of the soybeans that they could buy.

8/ Markley, K. S. and Goss, W. H., "The Chemistry and Technology of the Soybean and its Derived Products," Part II. U. S. Regional Soybean Industrial Products Laboratory, Urbana, Ill., U. S. Dept. of Agr., Bureau of Agricultural Chemistry and Engineering, 1942 (Mimeographed). See also article by W. M. Scott, "Soybeans to the Rescue," in the Soybean Digest, August 1945 issue.

As indicated by the quantities used for processing (table 5), the scale of operations expanded rather slowly at first, but as larger supplies became available, processing operations increased. The biggest jumps came in the period of 1934 to 1939 and in 1942-43.

Between 1934 and 1939 the growing demand for soybean products was stimulated by the drought of the early and middle 1930's and by the program of the Agricultural Adjustment Administration. Both played a part in reducing the production of hogs and of cotton. The supplies of lard and of cottonseed oil were therefore reduced relative to the demand for fats and oils and this strengthened the market for soybean oil. The drought also reduced production of feed crops, and this brought a rise in feed prices, including the price of soybean oil meal.

The large increase in processing in 1942-43 was in response to the Government's appeal and program to obtain greatly increased production of soybean oil and other domestic oils because of the large wartime requirements and because foreign supplies had been cut off.

Yellow-seeded varieties of soybeans are preferred for processing. Production of yellow-seeded varieties has been limited mainly to the North Central States and North Carolina. Most of the soybeans grown in the South are brown-seeded and black-seeded varieties.

The three methods in general use for obtaining oil from soybeans are hydraulic pressing, expeller or screw pressing, and solvent extraction. Hydraulic pressing, which is generally the least economical of these methods, is limited in the United States almost exclusively to mills which are or have been engaged primarily in crushing other oilseeds, mainly cottonseed and flaxseed. The proportion of soybeans processed by this method was large at first but declined steadily as mills specializing in soybeans were built. In 1936-37 hydraulic pressing accounted for about 18 percent of the soybeans processed in this country; in 1940-41 the proportion was less than 3 percent. Expellers or screw presses handled about 74 percent of the soybeans processed in 1940-41; solvent extraction accounted for 23 percent. There has been a rapid expansion in processing capacity of both expeller and solvent types of plants since the middle 1930's. The rate of expansion of solvent processing has been the greater of the two.

On the average, the yield from a bushel (60 pounds) of soybeans processed by an expeller press is about 9 pounds of oil and 48 pounds of meal. The meal contains from 40 to 45 percent protein and 4.0 to 5.5 percent oil. The average yield from a bushel of soybeans processed by the solvent method is about 10.5 pounds of oil and 45 pounds of meal. Solvent-process meal contains 43 to 48 percent protein and 1 percent or less oil. Variations from these averages may be considerable in individual cases because of the differences in oil and protein content of different varieties and of the same varieties grown in different locations, and because of differences in efficiency of operation of individual plants.

In the early part of 1944 approximately 100 mills that specialized in soybean processing were operating in the United States. These mills were located at 80 points, in 18 States. They had a total installed capacity of about 130 million bushels of soybeans per year. In addition, more than 100 other oilseed mills (mostly cottonseed mills) were crushing soybeans temporarily or only part of the time. New soybean mills were also under construction or contemplated.

As of July 1, 1944, there were 137 soybean-processing mills, counting those under construction and those definitely planned with priorities approved. The total annual capacity of these mills was estimated at 172 million bushels - a volume 20 percent larger than the entire quantity of soybeans processed in 1943-44. In addition to this was the temporary or part-time capacity for processing soybeans represented by mills that specialized in crushing other oilseeds. No specific data were available as of July 1, 1945 but it was estimated that neither the number of mills nor the total capacity was very different from that indicated a year earlier.

Soybean Oil Meal

Quantities of soybean oil meal and cake produced annually during the last 20 years are shown in table 6. ^{9/} Imports, exports, and total domestic supplies are also shown. Production, small in the 1920's, increased rapidly. In 1938-39 it was 140 times as great as in 1924-25. The quantity produced in 1943-44 was more than three times that in 1938-39.

Imports, although not large, comprised a considerable portion of the total supply until about 10 years ago. They have since declined. Most of the imports came from Manchuria. Exports never amounted to a significant percentage of the supply.

The principal use of soybean oil meal in the United States is, and has been, for livestock feed. It is estimated that from 90 to 98 percent of the total domestic disappearance has been for this use. Other uses are industrial products, mixed fertilizers, and soya flour. Industrial products, in which the meal or protein is used, include plywood glue, molding compounds, core-binder compounds, plastics (especially in the automobile and electrical-appliance industries), paper coatings, paper sizing, cold-water paints, and foam solutions. Substantial tonnages of soybean meal were used in the manufacture of mixed fertilizers before the war but this has not been permitted during the war.

Perhaps less than 1 percent of the production of soybean meal or protein was used in making soya flour in the years immediately preceding World War II. Manufacture of soya flour was greatly increased during the war, and the quantity produced in 1943 was equivalent to about 3 percent of the total soybean crop. A large proportion of this was purchased by the Federal Government for Lend-Lease.

^{9/} Soybean cake is the protein product of soybeans as it comes from the presses. When this cake is ground it becomes soybean oil meal.

Table 6.- Soybean oil meal and cakes: Supply in the United States, 1924-43

Year beginning October 1	: Domestic production :	: Imports 1/ :	: Exports 2/ :	: Domestic supply 3/ :
	: <u>1,000 tons</u>	: <u>1,000 tons</u>	: <u>1,000 tons</u>	: <u>1,000 tons</u>
1924-25	: 7.6	: 18.3	: ---	: 25.9
1925-26	: 8.6	: 19.8	: ---	: 28.4
1926-27	: 8.3	: 23.9	: ---	: 32.2
1927-28	: 13.7	: 47.7	: ---	: 61.4
1928-29	: 21.5	: 69.5	: ---	: 91.0
1929-30	: 40.7	: 73.5	: ---	: 114.2
1930-31	: 98.6	: 24.0	: ---	: 122.6
1931-32	: 114.7	: 18.6	: ---	: 133.3
1932-33	: 84.3	: 28.3	: ---	: 112.6
1933-34	: 73.9	: 25.0	: ---	: 98.9
1934-35	: 220.4	: 64.2	: ---	: 284.6
1935-36	: 613.1	: 20.0	: ---	: 633.1
1936-37	: 495.8	: 55.7	: ---	: 551.5
1937-38	: 724.1	: 15.5	: ---	: 739.6
1938-39	: 1,064.4	: 12.3	: 35.0	: 1,041.7
1939-40	: 1,348.8	: 14.1	: 62.3	: 1,300.6
1940-41	: 1,543.4	: 8.1	: 25.4	: 1,526.1
1941-42	: 1,844.9	: 0	: 19.7	: 1,825.2
1942-43	: 3,179.2	: 0	: 20.9	: 3,158.3
1943-44	: 3,444.8	: 0	: 16.1	: 3,428.7

1/ Imports for consumption beginning Jan. 1934.

2/ Exports, if any, not reported separately before January 1939. The figure here shown for 1938-39 is the estimated total for the year beginning Oct. 1, 1938.

3/ Sum of production and imports, minus exports.

Soybean oil meal has been gaining in favor among livestock feeders for several years. The quantity fed in 1935-36 was five times the quantity fed in 1930-31; in 1939-40 it was more than twice that of 1935-36, and in 1943-44 it was two and one-half times that of 1939-40. During World War II it was used for the first time by large numbers of feeders. Results have been generally very satisfactory, and it is believed to have become firmly established in the feed market. Feeding experiments have shown it to be superior to other common vegetable-protein concentrates, especially for poultry and hogs.

In 1938-39 soybean meal comprised somewhat less than one-third of the total tonnage of oilseed meals fed to livestock in the United States. In 1943-44 approximately one-half of the total tonnage was soybean meal.

Soybean Oil

Soybean oil first attained commercial importance in the United States during World War I, when large quantities were imported (mainly from China and Japan) to replace oils and fats exported to Europe. In 1918 the record quantity of 336 million pounds was imported. Following that war imports decreased sharply, to 196 million pounds in 1919 and 17 million pounds in 1921.

Imports for consumption from 1924 through 1929 varied from about 9 million up to about 30 million pounds annually (table 7). In 1932, less than one-half million pounds were imported. Since 1933, imports have been relatively small and fairly stable, except that in 1935 and 1937 they were increased because of the reduced domestic production of cottonseed oil, lard, and other fats.

The Tariff Act of 1930 was an influential factor in the decrease in imports of soybean oil, soybean oil meal, and soybeans in the years that followed. By this act the import duty was raised from 2.5 cents to 3.5 cents per pound on the oil; the duty on the meal or cake was set at \$6 per ton and on soybeans at \$1.20 per bushel. These duties are still in effect.

Domestic production of soybean oil was smaller than imports until 1930, but after that production increased rapidly -- along with the increase in soybeans crushed. The quantities of soybean oil produced annually from 1924 through 1944 are shown in table 7. Production in 1924 was less than 1 million pounds; in 1943 it was almost 1 1/4 billion pounds.

During the last 30 years the principal use made of soybean oil in the United States has been at times in soap, at other times in the drying industries, and most recently in food products. Soybean oil has qualities that make it very adaptable to a wide variety of uses. It is classed as a semi-drying oil, having an iodine number of about 133, compared with 110

Table 7.- Soybean oil: Supply and utilization in the United States, 1924-44

Calendar year	Supply			Utilization										Carryover Dec. 31
	Stocks Jan. 1	Domestic production	Imports for consumption	Domestic supply	Shortening 1/	Margarine	Other edible products	Drying trials 2/	Soap	Other industrial oil in : foots	Losses	Exports 3/		
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	
1924	9,451	960	8,848	19,249								2,264	2,856	
1925	2,836	2,520	17,745	23,101								520	2,458	
1926	2,458	2,646	30,167	35,271								1,567	7,725	
1927	7,725	3,088	15,751	24,542								5,444	6,291	
1928	6,291	4,716	12,264	25,271								7,142	6,073	
1929	6,073	11,009	19,580	36,442								7,967	15,631	
1930	15,631	14,987	7,861	37,849								4,962	15,178	
1931	15,178	39,150	4,018	58,346								4,551	18,650	
1932	18,650	39,445	359	58,454	10,869	622	7,261	8,901	5,816	2,051	1,625	2,647	16,552	
1933	16,552	26,535	5,669	46,754	4,889	5	14,166	11,695	5,571	1,875	1,188	2,647	15,534	
1934	15,534	35,966	2,829	51,729	489	7	9,153	14,274	4,235	2,626	867	1,569	15,007	
1935	19,007	105,066	14,249	138,312	2,735	24	10,284	15,555	1,554	2,109	823	2,040	31,090	
1936	31,090	225,297	4,217	260,604	52,452	1,740	21,566	17,871	2,549	1,665	5,468	4,111	54,416	
1937	54,416	194,411	22,259	251,086	115,897	14,261	59,270	17,419	5,025	3,405	8,959	3,954	62,517	
1938	62,517	323,345	2,856	388,516	90,798	31,791	20,067	17,157	10,274	3,068	9,926	5,748	76,709	
1939	76,709	457,550	4,126	538,585	137,153	39,885	79,247	18,847	10,897	5,340	14,046	6,412	71,562	
1940	71,562	533,224	4,849	609,635	201,599	70,822	117,297	28,220	11,177	9,352	16,265	12,111	94,555	
1941	94,555	585,628	759	680,945	212,517	87,106	107,468	37,164	17,612	16,558	20,924	15,954	115,020	
1942	115,020	761,582	0	874,602	215,967	75,634	140,147	49,515	24,737	25,445	26,412	12,086	144,139	
1943	144,139	1,235,751	0	1,377,890	335,555	133,546	129,550	25,928	31,510	15,636	41,540	19,428	186,566	
1944	186,566	1,255,806	108	1,422,475	568,406	198,020	205,266	20,793	15,428	33,075	92,989	57,351	121,897	
					620,257	211,105	278,956	19,176	3,258	51,767	70,637	65,422		

1/ Compounds and vegetable cooking fats.

2/ Includes paints and varnishes, linoleum, oilcloth, and printing inks.

3/ Exports from domestic production and stocks. Does not include reexports.

for cotton-seed oil and 180 for linseed oil. 10/ The fatty-acid composition of soybean oil is another quality which gives it versatility.

Soybean oil was first used in the United States in its crude state, principally in the manufacture of soft soaps. During World War I the largest percentage of the imports went into soap, but a considerable quantity was used in the manufacture of shortening, margarine, paint, varnish, and explosives. During the period of 1933-34 drying industries took a larger percentage of the supply than either the food or soap industries. Beginning in 1935 there was a large increase in the proportion used for food purposes. Since then its predominant use has been in edible products (table 7).

The use of soybean oil for food was stimulated by supply and demand conditions in World War II. In 1943, 79 percent of the domestic production was used for edible products. In spite of this, the actual quantities used in the drying industries, in soap, and in other industrial manufactures were all considerably larger than in 1938 and earlier years.

The China-Japanese war caused a reduction in American imports of tung oil, beginning in the late 1930's, and use of soybean oil for drying purposes was then increased. In 1942 and 1943 more adequate supplies of linseed oil and increased requirements of oil for edible products brought a reduction in use of soybean oil in the drying industries, largely through prohibition of use in non-food products for civilians.

The principal food use of soybean oil is for shortening, the next largest is for margarine, and the third largest is for mayonnaise and salad dressing. More than 50 different food products containing soybean oil are manufactured in this country. Much progress has been made during the last decade in methods of refining, bleaching, and otherwise improving the oil for food uses. In 1943, soybean oil made up 42 percent of the total oils and fats used in shortening, 40 percent of the total in margarine, and 16 percent of the total in other edible products.

In 1939 soybean oil comprised 5.6 percent of the total production of fats and oils (including butter, lard, tallow, and all vegetable oils) from domestic materials in the United States. In 1943 the proportion accounted for by soybean oil was 11.4 percent.

10/ Iodine number is an index of the drying power of an oil. A low iodine number indicates a slow-drying oil, a high iodine number a fast-drying oil. Quick drying is one of the prime requisites of an oil for use in paints and varnishes. Cottonseed oil is the principal vegetable oil for food-products manufacture in the United States; linseed oil is the leading oil in the paint and varnish field.

Prices

Season average prices of soybeans, soybean oil, and soybean oil meal are shown in table 8. Prices of cottonseed oil and meal, of linseed oil and meal, and of peanut oil and meal are also shown.

The important elements in the price of soybeans are the prices of soybean oil and soybean meal. 11/ The demand for soybeans as seed had an important influence on average price when the total supply was not very large relative to the quantity demanded for seed. The relatively high average farm prices of soybeans from 1924-25 through 1930-31 are explained chiefly by the large proportion of the supply that was sold as seed in those years. The differences between average farm prices of soybeans and average Chicago prices of soybeans for crushing are accounted for mainly by the grade and cost of transportation.

Soybean oil is used both in drying industries and in food products, and its price therefore is influenced considerably by prices of linseed oil and cottonseed oil. These two oils have generally been the dominant sources of supply in the drying industries and food industries, respectively, in this country. 12/ Because of the general preference of the drying industries for linseed oil and the preference of food industries for cottonseed oil, soybean oil has been given a rather secondary role, entering these fields largely on the basis of its lower price.

Prices of drying oils have generally been higher than prices of food oils, because of the supplies available relative to demand in these fields. When the drying industries absorbed a large proportion of the supply of soybean oil its price averaged higher than the price of cottonseed oil. This was the case in a number of years before 1935. In 1935 and later years, however, the supply of soybean oil was so large that the quantity taken for drying purposes was only a very minor share of the total, and soybean oil competed primarily with cottonseed oil in the food field. Its average price has been somewhat below that of cottonseed oil.

Soybean meal has usually sold at a higher price than cottonseed meal or peanut meal. However, the differences in price of these meals generally have been smaller in the northern States (the principal feeding region) than the differences indicated by the prices listed in table 8. This is because larger costs of freight and handling generally have to be added to the mill prices of cottonseed and peanut meals to make them comparable with prices of soybean meal in that region. Prices of soybean

11/ At December 1944 prices the oil accounted for 48 percent and the meal for 52 percent of the combined value of these products from a bushel of soybeans, on the average, at midwestern mills.

12/ "Food industries" as used here exclude butter and lard.

Table 8.- Prices: Season average prices of soybeans, soybean oil, soybean oil meal, and of other specified vegetable oils and oil meals in the United States, 1924-44

Year	Soybeans : U. S. : average : farm : price : per bu. : Oct 1- : Sept. 30:	Soybeans : for : crushing : at : Chicago : per : bu. 1/ : Oct. 1- : Sept. 30:	Soybean : oil at : mid- : western : mills : per : lb. 2/ : Oct. 1- : Sept. 30:	Cotton- : seed : oil at : south- : eastern : mills : per : lb. 3/ : Aug. : July :	Linseed : oil : at : at : Minneapolis : per : lb. 4/ : July- : June :	Peanut : oil : at : south- : eastern : mills : per : lb. 5/ : Oct. 1- : Sept. 30:	Soybean : oil : meal : at : Chicago : per : ton 6/ : Oct. 1- : Sept. 30:	Cotton- : seed : oil : meal : at : Minneapolis : per : ton 7/ : Aug. : July :	Linseed : oil meal : at : at : Minneapolis : per : ton 8/ : July- : June :	Peanut : oil meal : at : south- : eastern : mills : per : ton 9/ : Sept.- : Aug. :
	Dollars	Dollars	Cents	Cents	Cents	Cents	Dollars	Dollars	Dollars	Dollars
1924-25 :	2.46	---	---	9.5	---	---	---	39.05	43.31	39.20
1925-26 :	2.34	---	---	10.0	---	---	---	33.60	45.24	39.90
1926-27 :	2.01	---	---	7.8	10.3	---	---	30.75	45.67	45.25
1927-28 :	1.81	---	---	8.8	9.2	---	---	45.65	48.35	46.85
1928-29 :	1.88	---	---	8.4	9.3	---	---	41.40	52.99	45.65
1929-30 :	1.88	---	9.1	7.3	13.6	7.52	50.40	36.70	52.72	36.75
1930-31 :	1.37	---	6.3	6.4	9.2	6.58	32.52	26.60	35.85	28.65
1931-32 :	.50	---	3.4	3.2	6.6	3.63	20.83	13.70	27.22	18.20
1932-33 :	.54	---	4.6	3.5	6.3	3.86	27.17	15.80	21.50	18.60
1933-34 :	.94	.839	5.9	4.1	9.4	4.76	33.34	21.70	32.24	27.15
1934-35 :	.99	1.059	7.8	8.5	9.0	8.98	34.12	32.30	39.50	29.30
1935-36 :	.73	.960	7.4	8.6	9.0	8.80	28.66	22.40	26.20	22.75
1936-37 :	1.27	1.429	9.1	9.2	10.0	9.21	40.61	34.35	43.95	36.20
1937-38 :	.65	.934	5.7	6.6	9.8	6.87	27.71	22.40	38.14	25.45
1938-39 :	.67	.853	4.8	6.0	8.4	5.96	25.98	22.15	38.56	21.65
1939-40 :	.81	.962	4.9	5.6	9.6	6.29	28.90	27.60	31.78	30.05
1940-41 :	.90	1.061	7.0	6.5	8.6	7.22	30.49	26.65	27.04	24.05
1941-42 :	1.55	1.685	11.2	12.3	11.1	12.71	41.87	36.60	37.42	40.70
1942-43 :	1.61	1.721	11.6	12.2	13.3	13.00	42.80	37.80	42.43	39.25
1943-44 :	1.82	1.901	11.8	12.8	14.4	13.00	51.91	48.55	45.33	53.00

1/ No. 2 yellow soybeans, bulk, in carlots. Simple average through 1938; weighted average in subsequent years.

2/ Domestic crude in tank cars.

3/ In tanks, f.o.b. southeastern mills.

4/ Raw in tank cars.

5/ Crude, f.o.b. in tanks.

6/ In carlots, 41 percent protein.

7/ In carlots, bagged, 41 percent protein.

8/ In carlots, bagged, 34 percent to 37 percent protein.

9/ F.o.b., 45 percent protein.

meal have generally been closer to the prices of linseed meal than they have to prices of cottonseed meal. Previous to 1940-41 the prices for soybean meal were usually somewhat lower than prices for linseed meal. For the last 4 years, however, prices of soybean meal have averaged higher than prices of any of the other three oilseed meals, with the exception of peanut meal in 1943-44.

Since 1942 the prices of soybean oil and soybean oil meal, as well as the prices of other oils and oil meals, have been affected by O.P.A. ceilings and Government-guaranteed support prices. Most of the time prices have remained close to the ceiling levels.

Future Prospects

An appraisal of future prospects must take into consideration past events, the present situation, and events that appear to be in the making. With this in mind, an attempt is here made to summarize and evaluate highlights in the picture relating to soybeans. These highlights, or factors, may be grouped under three categories: production, processing, and markets. As markets, or utilization, will be the most strategic or the ultimate factor in determining the volume of soybeans that will be produced and processed in this country, this subject is considered first.

Markets

Soybean meal for feed has found an expanding market at relatively favorable prices in competition with other vegetable-protein concentrates. More livestock producers than ever before have been feeding soybean meal during the war years. Results have been very satisfactory, and feeders have indicated that they will use it extensively in the future. Feeding experiments have shown it to have excellent nutritional properties. It has been demonstrated that, when soybean meal is used as a protein supplement for hogs and poultry, a smaller percentage of the feed than was formerly believed necessary for economical growth needs to be of animal proteins (tankage, meat scraps, fish meal, and milk or milk products).

Mixers of commercial feed have used large quantities of soybean meal to supplement the relatively short supplies of animal proteins during the war. Because of its advantages in uniformity of composition, keeping quality, and relative cost they are likely to use it extensively in the years ahead. Of course, as the animal-protein feeds are mostly by-products, they will be marketed and used to the extent that they become available in connection with the production of the main products with which they are associated. Soybean meal, however, will be more readily accepted as a supplement or extender of the animal proteins than it was before the war.

It is estimated that in the prewar period our livestock population as a whole received only about one-half of the supplementary protein

recommended by animal nutritionists. Educational efforts after the war, as well as the experience of feeders during the war, will probably increase this proportion. The expanded mixed-feed industry and the increase in popularity of commercial mixed feeds will also promote the use of larger quantities of high-protein concentrates. A larger percentage of farmers can be expected to feed protein supplements. The actual level of use of supplementary protein is likely to vary with the levels of prices of livestock and livestock products, and will be influenced by the relative prices of feeds and livestock products, as has been the case in the past.

Larger production of alfalfa and other legume roughages may cause some reduction in protein concentrates fed to dairy cows and other cattle in some areas. But an expansion in high-protein roughages would have little effect on the feeding of the largest consumers of protein supplements --hogs and poultry. With a general increase in use of protein supplements the demand for all high-protein feeds would be affected. It appears likely that soybean meal will make up a larger proportion of the total than was the case before World War II.

Increasing quantities of soybean meal are likely to be used for industrial purposes in the postwar period. Such uses have been retarded by Government restrictions and curtailment of certain manufacturing activities during the war. One of the most promising of these uses is in the manufacture of water-resistant plywood glue, which may be greatly increased, especially if there is large-scale activity in construction of prefabricated houses. Considerable quantities were used in various phases of the automobile-manufacturing industry before the war, and this may be resumed although some indications suggest that less expensive materials may form a more important source of plastics in this industry. If the process of manufacturing soybean wool is perfected this use would absorb large quantities of soybean meal. Whether soybean wool can be produced cheaply enough to compete with other fibers still remains uncertain. Research workers are enthusiastic about the possibilities of soybean protein for industrial uses. The use of soybean meal in mixed fertilizers is likely to be resumed in the period ahead.

Methods of processing soybeans and soybean meal in the manufacture of soya flour of improved quality have been developed. Partly as a result of this improvement, consumption of soya flour and grits by civilians in the United States has increased since the prewar period - from 0.1 pound per person per year in 1935-39 to 1.6 pounds in 1944. This quantity is not insignificant in view of the available quantities of several cereals. Soya grits have been promoted during the war chiefly as a meat extender and soya flour as a fortifier of cereal products. ^{13/} Use of soya flour in pre-mixed foods, such as pancake mix, has apparently increased and may easily grow still more, but demand for soya grits as a meat extender is likely to fall when meat is again plentiful. The taste and flavor of soya products

^{13/} "Cooking with Soya Flour and Grits," AWI-73, U. S. Department of Agr., Bureau of Human Nutrition and Home Economics, April 1943.

have not been particularly popular with consumers but the manufacture of products of improved quality may mean an increased demand. Research aimed at further improvement in the palatability of soya flour and at perfecting methods of using soya protein for food enrichment is being carried on by processors as well as in laboratories of State and Federal agencies.

Even though industrial and food uses of soybean meal may be greatly increased, its principal use is likely to continue to be in livestock feeding, for its future in the feed market seems bright. This is especially true if in the postwar period we achieve a level of prosperity that will provide a strong market for livestock products.

The sharp upward trend in the use of soybean oil in food products was further accelerated by the war. A large part of the wartime increase was the result of increased over-all requirements of fats and oils at the same time that imports of foreign oils were greatly reduced. Many manufacturers of food products were reluctant to use larger quantities of soybean oil than they did before the war. However, with limited supplies of cottonseed oil and corn oil (the two most popular food oils), soybean oil was the only practical alternative. The lower preference for soybean oil was attributed to inferior keeping quality and to objectionable color and flavor. Technical improvements in refining, bleaching, and hydrogenation have enabled manufacturers to overcome these undesirable features to a considerable degree. Soybean oil is now used in the same food products as cottonseed oil and with almost equally good results. Continued improvement of soybean oil for food uses may be expected in view of the large amount of research in this field.

Use of soybean oil in the drying industries is likely to be at a high level in the postwar period. This level will be influenced by the scale of activity in housing construction and in several lines of manufacturing. Its use for other industrial purposes during the next few years may not be so large as during the war. However, chemical research has proved the adaptability of soybean oil in producing a wide variety of industrial products (such as resins, coatings, and artificial rubber), and its use for some of them may become important.

The perfection of fractionation processes will make it practicable to separate an oil into portions that are superior to the original oil for given uses. For example, by fractionation, soybean oil can be separated into two portions--one that is faster drying than natural soybean oil and therefore more valuable for paints and varnishes, and another that has a lower iodine number than the original and may prove superior for food uses. Research on this technique is in progress and has significant possibilities.

The postwar market for soybean oil will be intimately affected by the general market situation for all fats and oils, for this is a highly competitive field. The general trend in per capita consumption of fats and oils in the United States has been upward for several years, and this, together with the increase in population would indicate a total domestic consumption in the 1950's considerably above that of the prewar period. The factor that will affect the market situation most will be the level of economic activity and employment in the Nation.

The apparent domestic disappearance of all fats and oils in 1939 was 9,593,000,000 pounds, with production from domestic materials at 8,211,000,000 pounds. A fairly conservative estimate for the postwar period might be an annual domestic disappearance of 11 billion pounds and an annual domestic production of 10 billion pounds. ^{14/} If we then assume that soybean oil will account for 8.5 percent of the total domestic production of fats and oils (a figure midway between those of prewar 1939 and wartime 1943) it would mean the harvesting of about 6,850,000 acres annually of soybeans for beans in the postwar period. ^{15/} This is slightly more conservative than the figure of 7,158,000 acres indicated in a preliminary national summary of estimates made in 1944 by Production Adjustment Committees in each State on the basis of what it would pay farmers to produce in the postwar period under conditions of full employment. A considerably more optimistic estimate would be 8 to 10 million acres, as estimated by a group of staff members of the U. S. Department of Agriculture for a 1950 situation of full employment in the United States. ^{16/}

Processing

Growth of the soybean-processing industry in the United States was very rapid during World War II. Not only was the capacity for processing greatly expanded, but the efficiency of processing was also increased. It is likely that the postwar period will see considerable excess capacity, and competition between mills may be expected to be keen.

^{14/} Lund, Charles E., "Fat Fundamentals and the Future," Soybean Digest, February 1945, pp. 20-21.

^{15/} This estimate also involves the following assumptions: That yields will average 20.5 bushels per acre, that 70 percent of the soybeans produced will be processed for oil and meal, and that the average yield of oil per bushel of soybeans processed will be 9.5 pounds.

^{16/} What Peace Can Mean to American Farmers, Misc. Pub. 562, U. S. Dept. of Agr., May 1945.

In early 1945, expellers and screw presses accounted for about 70 percent of the total capacity of mills that specialize in soybean processing, solvent extraction accounted for about 29 percent and hydraulic presses for about 1 percent. Solvent extraction generally yields about $1\frac{1}{2}$ pounds more oil and 2 to 3 pounds less meal per bushel of soybeans than is obtained by expellers or screw presses. This gives the solvent-process mills a distinct advantage over expeller and screw-press mills in returns for the products of crushing, as a pound of soybean oil is generally worth 4 or 5 times as much as a pound of meal. Hydraulic pressing is recognized as generally the least efficient method in terms of oil obtained as well as in terms of cost per bushel. The Government's wartime program for the soybean-processing industry has tended to equalize returns to the different types of mills, but this form of underwriting cannot be expected to continue in peacetime.

Soybean processors generally are keenly aware of the severe competitive situation that is practically sure to materialize in the industry in the years ahead. In 1944, the 8 largest processors had about 56 percent of the total processing capacity, while approximately 100 other processors accounted for the remaining 44 percent. The largest mill processes more than 10 million bushels annually; the smallest processes less than 100,000 bushels. The competitive position of individual plants will be affected by location, freight rates, market connections, and financial reserves, as well as by size and efficiency of operation. Many plant operators are planning to make adjustments aimed at strengthening their position. One of these adjustments is to convert to the solvent type of extraction process. At the same time there is a movement among soybean producers in some areas to build small cooperative processing plants in their communities. Small types of solvent extractors have been devised by manufacturers for such use. Thus it seems that, temporarily at least, there will be a still further increase in the capacity of the industry but it is likely that the least efficient plants will eventually be forced out of business.

Numerous private concerns as well as the Northern Regional Research Laboratory and other public research institutions are conducting investigations designed to develop more efficient techniques in processing soybeans. Much research is also under way on methods for improving the quality of oil and meal and for adapting these products to specific uses. This work has potentialities of leading to reduced costs of processing and to expanded markets for soybean products.

Official market grades for soybeans, as established and used before the war, did not give consideration to oil content. This is a very important factor to processors, as a difference of 1 percent in oil makes a large difference in the processing margin. During the war, oil content has been considered by the Commodity Credit Corporation in establishing the prices at which soybeans are resold to the processors under Government contract. It is to be expected that official market grades for soybeans in the future will include the factor of oil content, in addition to moisture, test weight,

color, dockage, and foreign material. This would reduce one element of risk to processors and would also be reflected to producers in the form of relatively higher prices for soybeans of relatively high oil content.

Production

As before and during the war, soybeans in the future will have to compete with other crops for the use of the farmer's land. Much will depend upon the relative per acre net returns that can be obtained from soybeans and other crops. The returns per unit for all crops will depend on costs and prices. The deciding factor to the individual farmer, however, will be the combination of crops and livestock enterprises that he believes will bring in the largest net return from his whole farm business--modified by his ability to bring about such a combination and by the value he places on such intangibles as degree of effort, personal likes and dislikes, and other personal interests.

The trend in acreage of soybeans was sharply upward in all the important producing regions of this country in the prewar period. In 1942 the increase in the United States as a whole was greater than in any previous year. In 1943 and 1944 the obstacles to continued expansion (the limitation of available cropland and the war demands for other crops) had become very difficult to overcome, and the upward trend was slowed down and then halted. The acreage of soybeans in 1945 is at about the level of 1943 and 1944.

The market situation will be the most influential factor in determining the level of soybean production in the post-war period. The most important elements affecting the market situation will be the level of national employment and the quantity of fats and oils that reach this country from abroad. The possibilities for exporting American-produced fats and oils and soybeans will also affect the domestic market for soybeans.

So far as competition with other crops is concerned, soybeans should be in a relatively stronger position in the postwar period than they were in the prewar years, assuming approximately similar price relationships in the two periods. The following are among the factors that have strengthened the position of the soybean crop.

1. Wider recognition among farmers of the importance of varietal adaptation has served to make the crop more consistently successful on a larger number of farms.

2. Improved varieties are now available for a wider range of soil and climatic conditions.

3. Several superior new soybean varieties have been developed and tested, and some of them have recently been made available for general use. The most outstanding of these is the Lincoln, which is adapted to a

broad belt extending from Ohio westward through the heart of the Corn Belt to eastern Nebraska. In tests throughout this belt over a period of 6 years, yields of the Lincoln have averaged about 20 percent higher than the average of the present standard varieties. It is estimated that in the spring of 1945 enough Lincoln seed was available to plant nearly 400,000 acres. The Lincoln is adapted to an area that now produces more than half of all the commercial soybeans grown in the United States.

4. Farmers have had more experience and have developed more skill in growing and handling soybeans. Many farmers who did not grow soybeans before the war have now had experience with the crop.

5. A much larger number of farmers in the Corn Belt now have combine harvesters, and so are better equipped for producing soybeans. Combines have simplified and speeded up the harvest, have reduced harvesting losses, and have made it possible for farmers to handle larger acreages of soybeans successfully. Combines have recently been improved so as to still further reduce the losses in harvesting.

6. Progress has been made in developing better adapted seed-producing varieties of soybeans for the South. Soybean breeding and testing work has recently been organized on a broader and stronger basis in the Southern States and this should increase the rate of improvement of varieties for the South.

7. Many Southern farmers are likely to be in greater need of other cash crops to supplement their acreage of cotton after the war. Soybeans may be a fairly good alternative in some areas. It does not appear at this time, however, that soybeans in the South will account for a very large proportion of our postwar national production of soybeans for beans.

Several forces will work toward a downward readjustment of soybean acreage in the postwar period. The importance of the market situation has been emphasized. The use of soybean oil in war industries will be discontinued or greatly reduced and the use in food products may be reduced. The total supply of fats and oils is almost certain to be large enough to meet demands without any special inducements to producers. Price supports for soybeans are likely to be lowered or withdrawn. In some parts of the Corn Belt, much cropland has been used for corn and soybeans, year after year during the war. Good farm practice will require an increase in the percentage of cropland in legumes or grass, as compared with the wartime situation, on many farms. This is especially true for sloping or rolling land. The improved, higher yielding varieties of oats that have been developed and introduced in recent years will give soybeans stronger competition than did the older varieties. Offsetting this, however, is the introduction of new, higher yielding varieties of soybeans.

A summary of the pros and cons relating to soybeans after the war would not be complete without calling attention to some rather important farm-management considerations that will have a tendency to maintain the acreage of the crop in this country at a fairly high level.

1. The soybean crop is adapted to the use of mechanized equipment. Most farmers in the Corn Belt and its peripheries already have the power, machinery, and equipment needed to grow soybeans.

2. Soybeans are well adapted to crop rotations in the Corn Belt. A common, and good, rotation is: Corn (1 or 2 years), soybeans, small grain, clover (or hay or pasture mixture). Some long-time tests show that small grains yield more on soybean stubble fields than when they follow corn or other small grains.

3. Soybeans are especially logical in rotations where control of the corn borer is a consideration. Soybeans are planted later than small grains and so allow more time for plowing under infested cornstalks in the spring. Small grains sowed in cornstalk ground (not plowed) prevent corn-borer destruction. Control of corn borer is now a very real problem in the eastern Corn Belt, and with the spread of this insect it will become increasingly necessary in a larger part of the region.

4. Soybeans in some areas fit well in rotations that include winter wheat. Early varieties of soybeans usually can be harvested early enough so that winter wheat can be seeded at the proper time in much of the Corn Belt.

5. The soybean crop is advantageous from the standpoint of distributing labor during the cropping season. Soybeans can be planted either before or after corn, they generally require one less cultivation than corn when seeded in rows (and no cultivation except harrow or rotary hoe when seeded solid), and they are harvested after small grain and generally before corn.

6. Soybeans will produce relatively well on soils that are too acid for other legumes.

7. Soybeans are more resistant than corn to drought.

8. Soybeans are still relatively free from insect and disease damage.

9. Soybeans have ranked next to corn in cash returns per acre in the Corn Belt. Generally they have shown definitely higher returns than any of the small grains.

In acreage of land occupied soybeans have ranked seventh among American crops, exclusive of hay and pasture, since 1942. In some counties in the Corn Belt soybeans have occupied more than one-third of the cropland, during the war. A substantial industry based on soybeans has been developed during the last decade. Although the close of the war and the resumption of world trade in fats and oils are expected to bring about a reduction in soybean production in the United States, it is not possible to say how large this readjustment will be. Several of the factors and forces that will have a bearing on the future competitive position of soybeans have been pointed out here. A consideration of these should be helpful when estimating the probable role of the soybean crop in the American postwar agricultural pattern.

Table 9.- Soybeans: Acreage planted for all purposes, United States, and selected groups of States, 1924-44

Year	United States	Five Corn Belt States <u>1/</u>	Three Delta States <u>2/</u>	Four Atlantic Coast States <u>3/</u>
	1,000	1,000	1,000	1,000
	<u>acres</u>	<u>acres</u>	<u>acres</u>	<u>acres</u>
1924	1,782	773	163	319
1925	1,785	670	194	367
1926	2,127	844	224	419
1927	2,350	1,011	347	390
1928	2,439	1,180	298	393
1929	2,807	1,372	364	429
1930	3,473	1,846	363	534
1931	4,304	2,418	464	547
1932	4,165	2,335	466	545
1933	3,957	2,150	444	489
1934	6,207	4,135	506	495
1935	7,503	5,296	608	535
1936	7,183	4,087	1,115	676
1937	7,464	4,421	1,073	683
1938	8,587	4,944	1,338	796
1939	10,920	6,911	1,347	867
1940	11,823	7,551	1,352	878
1941	11,391	6,888	1,515	885
1942	15,102	9,731	1,619	1,065
1943	15,854	10,154	1,778	1,193
1944	14,519	10,130	1,239	901

1/ Illinois, Indiana, Ohio, Iowa, and Missouri.

2/ Arkansas, Mississippi, and Louisiana.

3/ North Carolina, Virginia, Maryland, and Delaware.

Table 10.- Soybeans: Index numbers of acreage planted for all purposes,
United States and selected groups of States, 1924-44

(1935-39 = 100)

Year	: :United States: :	:Five Corn Belt :States 1/ :	:Three Delta :States 2/ :	:Four Atlantic :Coast States 3/ :
1924	: 21	15	15	45
1925	: 21	13	18	52
1926	: 26	16	20	59
1927	: 28	20	32	55
1928	: 29	23	27	55
1929	: 34	27	33	60
1930	: 42	36	33	75
1931	: 52	47	42	77
1932	: 50	45	42	77
1933	: 48	42	40	69
1934	: 74	81	46	70
1935	: 90	103	56	75
1936	: 86	80	102	95
1937	: 90	86	98	96
1938	: 103	96	122	112
1939	: 131	135	123	122
1940	: 142	147	123	123
1941	: 137	134	138	124
1942	: 181	190	148	150
1943	: 190	198	162	168
1944	: 174	197	113	127

1/ Illinois, Indiana, Ohio, Iowa, and Missouri.

2/ Arkansas, Mississippi, and Louisiana.

3/ North Carolina, Virginia, Maryland, and Delaware.

Table 11.- Soybeans: Index numbers of yields per acre harvested for beans and for hay, United States and selected groups of States, 1924-44

(1935-39 = 100)

Year	Yields of soybeans harvested for beans					Yields of soybeans harvested for hay			
	United States	Corn Belt States	Five 1/ ¹ : Three 2/ ² : Delta States	Four 3/ ³ : Atlantic Coast States		United States	Corn Belt States	Five 1/ ¹ : Three 2/ ² : Delta States	Four 3/ ³ : Atlantic Coast States
1924	61	56	74	126	:	86	89	90	87
1925	65	62	91	113	:	77	86	94	35
1926	62	60	82	105	:	90	87	108	101
1927	67	63	92	122	:	90	89	114	104
1928	75	76	81	112	:	94	92	116	98
1929	74	77	98	98	:	88	87	106	94
1930	72	76	80	78	:	72	74	84	72
1931	83	92	97	111	:	96	95	117	101
1932	83	91	82	81	:	95	100	99	76
1933	71	73	103	85	:	88	82	112	96
1934	82	83	80	95	:	82	76	90	98
1935	93	91	95	104	:	102	101	94	95
1936	79	79	76	96	:	73	67	91	89
1937	99	99	112	102	:	104	106	103	106
1938	113	115	107	99	:	109	111	104	104
1939	116	115	110	98	:	113	116	107	106
1940	90	87	108	104	:	102	96	114	104
1941	99	99	124	88	:	99	96	111	104
1942	103	105	134	115	:	103	106	107	116
1943	100	103	99	76	:	92	99	94	90
1944	102	100	136	94	:	89	88	100	98

1/ Illinois, Indiana, Ohio, Iowa, and Missouri.

2/ Arkansas, Mississippi, and Louisiana.

3/ North Carolina, Virginia, Maryland, and Delaware.

Table 12.- Soybeans: Acreage planted and acreage harvested for beans, in different parts of the North Central group of States, 1933-44

Year	Illinois, Indiana and Ohio		Iowa and Missouri		Minnesota, Wisconsin, and Michigan	
	Total	Harvested	Total	Harvested	Total	Harvested
	planted	for beans	planted	for beans	planted	for beans
	1,000	1 000	1,000	1,000	1,000	1,000
	acres	acres	acres	acres	acres	acres
1933	1,562	514	788	262	147	11
1934	2,539	950	1,596	322	395	12
1935	3,636	2,043	1,660	550	320	24
1936	3,121	1,709	966	237	201	23
1937	3,433	1,867	988	292	274	29
1938	3,624	2,183	1,320	368	302	49
1939	5,131	3,132	1,780	639	485	92
1940	5,466	3,288	2,085	818	653	155
1941	4,970	3,827	1,918	1,129	587	217
1942	6,900	5,667	2,831	2,289	847	484
1943	7,221	6,147	2,933	2,536	596	417
1944	7,117	6,124	3,013	2,735	609	422

Table 13.- Soybeans: Index numbers of yields per acre harvested for beans and for hay, in different parts of the North Central group of States, 1933-44

(1935-39 = 100)

Year	Illinois, Indiana and Ohio		Iowa and Missouri		Minnesota, Wisconsin, and Michigan	
	Beans	Hay	Beans	Hay	Beans	Hay
1933	77	78	72	88	81	96
1934	93	83	54	67	79	78
1935	93	102	86	102	97	105
1936	79	68	74	61	84	73
1937	98	106	102	105	97	91
1938	114	110	119	115	110	121
1939	115	114	118	119	113	111
1940	82	81	115	118	108	121
1941	101	94	97	98	99	105
1942	105	103	112	114	91	110
1943	102	95	112	108	98	105
1944	97	83	117	109	108	93

Table 14.- Soybeans: Acreage planted for all purposes, acreage harvested for beans and for hay, and acreage grazed, plowed under or abandoned, in the United States and in five Corn Belt States, 1924-44

Year	United States				Corn Belt States 1/			
	Planted 2/	Har- vested for beans	Har- vested for hay	Grazed, plowed under or abandoned	Planted 2/	Har- vested for beans	Har- vested for hay	Grazed, plowed under or abandoned
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
1924	1,782	448	1,147	187	773	259	478	36
1925	1,785	415	1,175	195	670	214	436	20
1926	2,127	466	1,451	230	844	263	537	44
1927	2,350	568	1,556	226	1,011	359	618	34
1928	2,439	579	1,609	251	1,180	376	745	59
1929	2,807	708	1,774	325	1,372	472	797	103
1930	3,473	1,074	2,062	337	1,846	796	980	70
1931	4,304	1,141	2,772	391	2,418	822	1,517	79
1932	4,165	1,001	2,738	426	2,335	721	1,526	88
1933	3,957	1,044	2,506	407	2,150	776	1,241	133
1934	6,207	1,556	4,227	424	4,135	1,272	2,714	149
1935	7,503	2,915	4,044	544	5,296	2,593	2,517	186
1936	7,183	2,359	3,116	1,708	4,087	1,946	1,514	627
1937	7,464	2,586	3,469	1,409	4,421	2,159	1,916	346
1938	8,587	3,085	3,724	1,828	4,944	2,551	1,919	474
1939	10,920	4,315	4,590	2,015	6,911	3,771	2,629	511
1940	11,823	4,786	4,894	2,143	7,551	4,106	2,757	688
1941	11,391	5,881	3,677	1,833	6,888	4,956	1,558	374
1942	15,102	10,008	2,738	2,356	9,731	7,956	1,035	740
1943	15,854	10,684	3,387	1,783	10,154	8,683	1,244	227
1944	14,519	10,502	2,747	1,270	10,130	8,859	1,073	198

1/ Illinois, Indiana, Ohio, Iowa, and Missouri.

2/ Equivalent solid.

Table 15.- Acreage of soybeans harvested for beans as a percentage of all cropland in each of 28 States and the United States, 1934, 1939, and 1944 ^{1/}

State	1934	1939	1944
	<u>Percent</u>	<u>Percent</u>	<u>Percent</u>
Illinois	3.75	10.24	16.84
Indiana	.19	7.49	12.28
Ohio	.39	5.04	11.92
Iowa	.90	2.70	9.43
Delaware	4.31	6.69	8.32
Missouri	1.09	.70	6.30
Arkansas	.29	.65	3.82
North Carolina	1.85	2.58	3.06
Maryland	.35	.92	2.01
New Jersey	—	.50	1.57
Virginia	.54	1.05	1.53
Minnesota	.01	.02	1.46
Michigan	.09	.64	1.42
Mississippi	.38	.41	1.36
Tennessee	.26	.28	1.14
Kentucky	.16	.41	1.03
Kansas	.03	.05	1.00
Louisiana	.19	.39	.71
Alabama	.14	.13	.71
Pennsylvania	.03	.18	.58
Wisconsin	.02	.11	.48
South Carolina	.09	.30	.29
New York	.01	.12	.22
Georgia	.01	.16	.16
Nebraska	—	.01	.15
West Virginia	.06	.06	.13
Oklahoma	.01	.01	.04
Texas	.01	.01	.01
United States	.43	1.26	3.07

^{1/} The "all cropland" acreages used in arriving at the percentages given in this table represent cropland harvested and crop failure; they do not include idle or fallow cropland or plowable pasture.

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